

REMARKS

Applicants appreciate the detailed examination evidenced by the Official Action mailed February 27, 2006 (hereinafter "the Official Action"). Applicants also appreciate the withdrawal of the previous rejections in response to Applicants' Amendment filed December 8, 2005.

In response, Applicants traverse the rejections in the Official Action for at least the reasons described herein, including the fact that even if Anma and Ebertseder were combined as alleged, the combination would not provide a conductive layer that comes in contact with the barrier layer and the upper surface, as claimed.

The Independent Claims Are Patentable Over The Cited References.

Independent Claim 1 stands rejected under 35 U.S.C. § 103 over U.S. Patent Publication No. 2002/0072195 by Anma et al. ("Anma") in view of U.S. Patent Publication No. 2002/00198802 to Ebertseder et al. ("Ebertseder"). *Official Action*, page 2. Independent Claim 1 to recite in-part:

forming an intaglio pattern in a mold layer;
forming a barrier layer on an upper surface of the mold layer and in the intaglio pattern; forming a flowable material on the barrier layer;
removing a portion of the flowable material and a portion of the barrier layer outside the intaglio pattern to expose an upper surface of an oxide layer included in the mold layer and avoiding removing a portion of the flowable material and a portion of the barrier layer inside the intaglio pattern;
removing the portion of the flowable material from inside the intaglio pattern;
forming a conductive layer on the portion of the barrier layer inside the intaglio pattern and on the upper surface **wherein the conductive layer comes in contact with the barrier layer and the upper surface**; and
removing the conductive layer from the upper surface.

To establish a *prima facie* case of obviousness, three basic criteria must be met. The prior art reference (or references when combined) must teach or suggest all the claim limitations. There must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings, and there must

be a reasonable expectation of success of the combination. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in applicant's disclosure. See MPEP § 2143. As stated by the Court of Appeals for the Federal Circuit, to support combining references in a § 103 rejection, evidence of a suggestion, teaching, or motivation to combine must be clear and particular, and this requirement is not met by merely offering broad, conclusory statements about teachings of references. *In re Dembiczak*, 50 USPQ2.d 1614, 1617 (Fed. Cir. 1999).

Even if Anna and Ebertseder were combined, the combination would not disclose or suggest all the recitations of independent Claim 1. In particular, the Official Action admits that Anna does not disclose or suggest:

forming a conductive layer on the portion of the barrier layer inside the intaglio pattern and on the upper surface wherein the conductive layer comes in contact with the barrier layer and the upper surface; and
removing the conductive layer from the upper surface,

and therefore relies on the following paragraph of Ebertseder to allegedly provide the admitted missing teachings from Anna:

[I]ntroducing metal into the alignment trenches and the contact holes and subsequently treating the surface of the insulator layer with chemical mechanical polishing, wherein the metal areas are lowered in a region of the alignment trenches and form profiles for the alignment marks. *Ebertseder, paragraph 31*.

As demonstrated by the above-cited passages of Anna and Ebertseder, a combination of these two references would, at most, provide a conductive layer 6 (from Ebertseder) in contact with the Tungsten film 5a (from Figure 21 of Anna), which does not disclose that "**the conductive layer comes in contact with the barrier layer**" as the barrier layer in Anna (the titanium layer 4) would be separated from the conductive layer 6 by the Tungsten film 5a and, therefore, the conductive layer would not be in contact with the barrier layer as claimed.

In further contrast to embodiments according to the present invention, both Anna and Ebertseder discuss alignment structures, not contact structures. For example, as shown in Figures 3-15 of the Application, the formation of structures in

some embodiments according to the invention contact an underlying metal layer 105, whereas both Anna and Ebertseder are intended to provide alignment structures, which do not contact underlying conductors. Rather, the alignment structures are used to optically detect alignment of different processing steps, and not to provide contact to underlying structures. Accordingly, even if Ebertseder and Anna were combined, the combination would not disclose or suggest all the recitations of the independent Claim 1.

Furthermore, there is no clear and particular evidence of a motivation or suggestion to combine Anna and Ebertseder. For example, the primary thrust of Anna is the effect that the formation of structures discussed therein can have on the profile of the barrier layers formed therein. *See, for example, Anna, paragraphs 10-14.* In contrast, the primary object of Ebertseder is to ensure that the alignment marks are easily detectable, and moreover, does not even discuss a barrier layer.

Furthermore, the use of tungsten as shown in Figure 4 of Ebertseder overlying the metal 6 **may promote the scratching** of the underlying metal layer 6 as discussed in Applicants' disclosure:

During the CMP process, remnants of the diffusion barrier layer 4 may cause a top surface of the aluminum line 5a to be scratched, which may cause defects in the device having the aluminum line 5a. For example, the scratches may cause the electromigration (EM) characteristics of the aluminum line 5a to deteriorate or the debris from the scratches may cause electrical shorts. *Specification, page 2, lines 1-5.*

Accordingly, the formation of tungsten over the metal layer 6 (followed by the subsequent removal of the tungsten layer) in Ebertseder may scratch the underlying metal layer which may create some of the problems known in the prior art as described by Applicants.

Accordingly, amended independent Claim 1 is patentable over the cited references for at least these reasons. Applicants further submit that dependent Claims 2-18 are patentable at least per the patentability of amended independent Claim 1.

With regard to independent Claims 19 and 20, these claims stand rejected under 35 U.S.C. § 103 over Anna in view of Ebertseder and further in view of U.S. Patent No. 6,645,851 to Ho et al. ("Ho"). *Official Action, page 3.* Applicants submit

that Anna and Ebertseder do not disclose or suggest, either singularly or in combination, all of the recitations of amended independent Claims 19 and 20 for at least the reasons described above. Furthermore, Ho does not provide the teachings missing from Anna and Ebertseder.

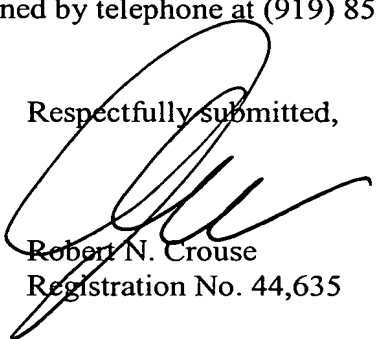
Both Claims 19 and 20 include detailed recitations of, for example, forming a barrier layer in a groove and outside a groove on an upper surface of an oxide layer. In contrast, the portion of Ho alleged by the Official Action to disclose the groove recited in Claims 19 and 20 **does not include a barrier layer**. Accordingly, even if the cited references were combined, the combination would not disclose or suggest these additional recitations. There is also no clear and particular evidence of a motivation or suggestion to combine at least Anna and Ebertseder as described above. Even if these references were combined, the combination would not disclose or suggest the recitations described above.

CONCLUSION

Applicants have shown that even if the references were combined, the combination would not disclose or suggest all of the recitations of the claims as required under Section 103. Applicants have shown that there is also no clear and particular evidence of a motivation or suggestion to combine these references. Applicants respectfully request the withdrawal of all rejections and the allowance of all claims for at least the reasons described herein. If any informal matters arise, the Examiner is invited to contact the undersigned by telephone at (919) 854-1400.

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In re: Jong-myeong Lee et al.

Serial No.: 10/813,330

Filed: March 30, 2004

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A handwritten signature in black ink, appearing to read "Audra Wooten".

Audra Wooten